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AUTHOR Cepica, M. J.; And Others
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ABSTRACT

A study examined current usage of microcomputers, projected software needs, and teacher inservice training needs in Texas vocational agriculture programs. Questionnaires were mailed to each of the 922 vocational agriculture departments in Texas. Data from the 446 usable instruments returned were tabulated by geographical area and school size. Next, currently available vocational agriculture-related software was reviewed, and priority areas for software development were established. Larger schools tended to use microcomputers more than small schools for both administration and teaching. Computers were used more frequently for instructional rather than for administrative purposes, with microcomputers being used in agricultural production courses more often than in any other program area. Fifty-four percent of those teachers not already using microcomputers planned to do so within the next five years. Forty-two percent of the schools responding to the survey had microcomputers available for use by vocational agriculture students and teachers, with most being located in a special computer lab. Although numerous sources of agriculture-related software were available, a critical shortage of practical and economical programs was identified. Both pre- and inservice instruction in the use of microcomputers and computer-assisted instructional techniques were deemed necessary. (The survey instrument is appended.) (MN)

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INTEGRATION OF COMPUTER RELATED INSTRUCTION

IN TEXAS VOCATIONAL AGRICULTURE PROGRAMS

June 30, 1984

F I N A L R E P O R T

for research performed in cooperation with the Research Coordinating Unit, Department of Occupational Education and Technology, Texas Education Agency, Austin, Texas

PROJECT DIRECTOR: M. J. Cepica
Texas Tech University

PROJECT STAFF: Jerry Stockton
Texas Tech University
Lewis Eggenberger
Texas Tech University
John Dillingham
Texas Tech University
Carl G. Igo
Texas Tech University
Treva D. Snodgrass
Texas Tech University

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CHAPTER I

INTRODUCTION

Technology is changing the world daily. Educators, especially vocational educators, must stay abreast of the changes in technology in order to be effective in teaching students a marketable skill. An area which vocational educators should be particularly attuned is computer education. Computers have been used as educational aids for several years in math classes to perform repetitive calculations and in graphics demonstrations for science classes. A far more important consideration, however, may be the career aspect. Computer literacy is especially important for students in vocational agriculture programs, since computers are used throughout the agricultural sector, from the small family farms to the multi-national agricultural corporations.

Computer literacy is important not only for those students seeking vocational careers, but also to those students who plan to gain a college education. Most college curriculums, regardless of major, include at least one computer course. The student who learned

the basics of computer operation in high school would have the advantage of approaching college classes with introductory level computer skills.

Most vocational agriculture teachers are only beginning to understand the possibilities of using computers as instructional aids. There is still considerable awe of computers. According to Hallworth and Brebner (4), teachers seem to fear that the computer will make the classroom teacher obsolete. They point out that the fear is unfounded. The success or failure of any Computer Assisted Instruction depends primarily upon the teacher. Used as instructional tools, computers can provide more accurate, up-to-date information than would normally be available. Vocational agriculture teachers may use computers to simulate a situation which would not be feasible to bring into a classroom. Computer-Assisted Instruction is also adaptable to individualized instruction, small group instruction, or for teaching an entire class; thus it can be helpful to both the slow learners and the accelerated students. When used appropriately by teachers, computers can actually improve knowledge retention and the speed at which learning occurs (3). The use of computers in vocational agriculture programs can be beneficial not only to the student but to the teacher as well.

Purpose and Objectives of the Study

The purpose of this project was to determine the current usage of microcomputers, to determine projected software needs, and to determine teacher inservice needs in Texas vocational agriculture programs. To accomplish that purpose, the following specific objectives were developed:

1. To identify existing types of computer software which are adaptable for use by vocational agriculture students and teachers.

2. To ascertain additional software needs for use by vocational agriculture teachers regarding computer instruction.

3. To determine inservice needs of vocational agriculture teachers regarding computer instruction.

4. To determine what computer hardware and software is accessable to vocational agriculture programs.

5. To project future computer equipment needs in public schools.

6. To recommend procedures needed to incorporate instruction related to computers in regular vocational agriculture programs in Texas.

Need for the Study

Vocational agriculture teachers must have instructional resources available to prepare students with the skills necessary to gain entry-level agricultural employment. Those skills are no longer limited to agricultural laborer type skills, but also include basic technological skills.

The impact of technology and the need for computer related instruction has been expressed through numerous sources within both the fields of industry and education. The Advisory Council for Technical-Vocational Education in Texas, in cooperation with the Texas Education Agency, recently addressed computer related issues in a Statewide Conference on High Technology (1). Conference topics addressed the need for educators to provide students opportunities to develop skills which would aid the students in future employment positions. Emphasis was given to development of teaching certain skills to fulfill an occupational objective rather than teaching from an abstract point of view.

A 1982 report by the Advisory Council for Technical-Vocational Education in Texas, entitled "Vocational Education in Texas," (2) supports the need for vocational programs to revitalize the curriculum to

include computer instruction. The report indicated that although computers are used in many schools as a classroom teaching aid, the extent and effectiveness of computer usage is not currently known. The Council recommended in the report that the State Board for Vocational Education

should:

1. Conduct a statewide computer resource, utilization and needs survey of secondary and post secondary institutions as it relates to instruction.

2. Develop a plan of action for developing computer literacy among vocational personnel and students, and expand current micro-computer technology in the vocational education curriculum.

The need has been established for upgrading the Texas educational system through instruction and practical application regarding computers. New rule 19 of the Texas Administrator's Code (16) proposes the inclusion of computer related instruction in regular vocational programs in order to provide a well balanced curriculum. The need is further addressed in the proceedings of the USDA Joint Council which states, "Everything possible must be done to insure that students in agriculture-related curriculums have computer skills" (10).

Assumptions of the Study

The basis for this study was made on the following assumptions.

1. The returned questionnaires would be a representative sample of all Texas vocational agriculture departments.

2. The vocational agriculture teachers' responses to items in the questionnaire would be accurate.

3. The methods used to collect and summarize data would yield accurate information.

CHAPTER II

REVIEW OF LITERATURE

Research on the subject of microcomputer applications to education has been limited to date. A review of selected references indicated that educators are only beginning to view computers as a viable instructional aid. Vocational agriculture teachers and teacher educators in agricultural education departments have only recently become aware of the wide range of benefits a microcomputer can have on classroom instruction.

Several limiting factors exist which hinder the use of microcomputers in vocational agriculture classrooms (12). One major drawback has been the limited availability of microcomputers to vocational agriculture departments. Another problem has been the small amount of applicable software packages which have been developed for use in vocational agriculture courses. As vocational agriculture teachers begin to accept computers as beneficial instructional aids and begin to request microcomputers for use in their programs, the problem of computer availability should be reduced.

However, according to Neason and Miller (11), "Teachers must be involved in preparing software for classroom use because computer programmers are not attuned to instructional processes." Eliminating these, as well as other limiting factors, should increase the use of microcomputers in vocational agriculture classes.

Computer Assisted Instruction

Computer Assisted Instruction (CAI) is, according to Hudson (6), "the use of the computer in either providing or assisting the instructional process." Over the past several years, any instructional process using the computer in the classroom has been termed CAI. Hudson categorized CAI into four classifications or modes. Each mode employed a different method students used to complete a program or problem.

The drill and practice mode has been used primarily for mathematics. The strategy was to simulate interaction between the student and the teacher in a homework assignment manner. Drill and practice exercises have been used to evaluate a student's comprehension of a specific learning sequence resulting from classroom instruction. Sleeman and Brown (13) criticized the drill and practice mode. They pointed out that the technique does not actually teach, but does provide a

means of measuring the results of instruction performed by the teacher.

In the tutorial mode of CAI described by Hudson (6), the student would actually receive instruction from the computer. The instructor would be freed of instructional tasks and, while acting as a director and trouble-shooter for the student, would have more opportunity to interact with students on an interpersonal basis.

The dialogue mode, sometimes called problem solving, was designed to operate logically and to interact with the student, according to Hudson (6). A typical dialogue program would pose problems to the student, provide relevant data needed to solve the problem, perform calculations, then evaluate the student's efforts in solving the problem logically. The program would be able to interpret a student's reasoning in solving a problem and determine if the reasoning was sound.

The last mode of CAI described by Hudson (6) was the simulation mode. Operating under this mode, the computer could replicate a real situation or problem. The simulation mode has proven most effective in actually teaching the students. Students retained more of the learning from using the simulation mode than the

other methods of CAI. According to studies by Hawkridge (5) the simulation mode has proven to be a very effective means of teaching vocational courses. Vocational instructors may use the simulation mode to bring into the classroom a situation which could not normally be represented due to time or other restraints.

Roles for Computers in Education

According to Taylor (15), there are three potential roles for computer usage in education. The most common role is the use of the computer as a tutor. Under this method the subject matter is presented to the students by the computer. The student responds to questions and the computer selects the next item based on the students response. This method is especially useful in informational and reinforcement programs for remedial instruction. The second role is the use of the computer as a tool. This includes integrating programs and experiential programs. With this method the computer is used as an instructional aid to make up a part of a teaching unit. Using the computer as a tool, combined with other teaching methods, the instructor can better illustrate concepts beyond the scope of normal classroom instruction. Taylor's third role for computers in education is the role of tutee. This method requires the student to

teach the computer. Simply stated, this method is actual programming by the student. According to Taylor, this role should be the ultimate goal of computer instruction for students. The tutee role requires the student to learn a computer language, develop an understanding of the subject matter and perhaps most importantly, to think logically.

Neason and Miller (11) explained that the best use for computers in vocational agriculture programs is in the tool role. Tool programs permit students to solve complex realistic problems by minimizing the need to focus on mathematical computations. The software available for use in vocational agriculture programs is oriented toward the agriculture industry. This software includes programs which are tools for record keeping and management decision making. Another advantage of the tool role for vocational agriculture is that one computer can be effectively used to teach an entire class. Effective use of the tutor or tutee roles would require a terminal for each student.

Kleene (9) determined that computers may be used effectively to teach an entire class, a small group, or an individual by using different types of CAI. Simulation programs and selected problem solving techniques work well when teaching a class. Kleene suggested using

television monitors to increase visibility for all students. When teaching a small group, the simulation and problem solving modes have proven most effective. All types of CAI may be used effectively for individualized instruction.

Benefits of Computers in Education

After a 1983 study of midwestern farmers, Rodenstein (12) predicted that over the next five years farmers will buy close to one-half million computers. Those farmers will also be hiring employees with computer knowledge.

A University of Michigan study cited by Bracey (3) showed that students receiving CAI performed better on objective tests than students who did not receive Computer Assisted Instruction. The students with CAI averaged on the 63 percentile while the control group of students averaged only a 50 percentile. The study also yielded data showing that CAI improved retention and speed at which students learn a given amount of material. The researcher did conclude, however, that the way the computer is used is much more important than the fact that the computer was used.

There are certain positive social benefits from using computers as well, according to an Arizona State

University study reported by Bracey (3). In a study of social outcomes from computer use in schools researchers concluded that students using computers felt more in control of themselves and their environment. Cooperation among students was increased as the students worked together to run a program. The students also showed more motivation and interest in the content of the material being taught.

The Educational Testing Service performed a four year study of computer assisted instruction in California schools (3). CAI was determined to be an effective learning aid over both short and long term periods. That conclusion added credibility to the idea that computers' innovativeness does not wear off after a short period of time. It was also concluded that, unlike some other approaches to compensatory education, CAI could be easily replicated.

Hudson (7) presented several other values of using computers in education, especially vocational education. In a speech to the American Vocational Association, he stated the following:

1. Long term events could be studied in a shorter time period.
2. Simulation of real-life situations.
3. Variables in management problems could be easily changed.

4. Programs could be adapted to better fit local situations (7).

Software Selection

Educators often overlook the most important part of establishing effective computer use in education, according to Huntington (8). Computers cannot be used to maximum capability without effective software. Huntington set forth two major guidelines which educators should follow in selecting software. Previewing software before purchasing is the first step to establishing a usable software library. The teacher should also evaluate the software's potential for adaptation to local applications.

Steinberg (14) established three areas of software review to which educators should be particularly attuned. The first area was the suitability of the lesson for the intended students. The programs should be designed at a difficulty level so as to be challenging to students, and yet be understandable and interesting as well. The teacher-reviewer should also note the quality of implementation of the features of CAI. Certain subjects lend themselves more to a certain mode of CAI than do other subjects, however, to motivate students, the programs should contain exercises in more than one

mode. Steinberg's third area for software review was for the teacher to observe students using the software. Software should be designed in such a way that students would be able to understand and complete a program with very little teacher supervision.

CHAPTER III

METHODS AND PROCEDURES

This project was conducted in two phases simultaneously. Phase I was comprised of a descriptive survey of Texas vocational agriculture programs. Phase II consisted of feasibility studies of existing software and development of additional software packages as determined by the vocational agriculture program study.

Phase I

The Population

The population surveyed in this study was composed of all the vocational agriculture departments in the ten geographic areas of Texas.

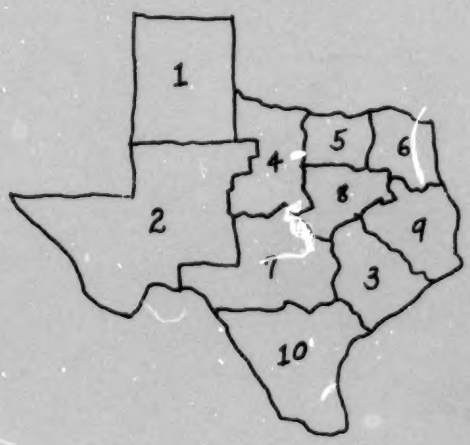

Fig. 1 Ten Geographic Areas of Texas Vocational Agriculture

There were 922 vocational agriculture departments in Texas during the 1983-1984 school year. For this study, all the departments in each of the areas were mailed a questionnaire. Approximately four weeks later, a follow-up mailing was made. Vocational agriculture teachers from 465 of the departments returned completed questionnaires, yielding a 50.4 percent return. Of the questionnaires returned, 446 usable returns were included in data tabulation.

The Survey Instrument

A teacher questionnaire was developed which included short answer, listing, and open-ended questions. The questionnaire was comprised of three parts. Part I and Part III were printed on yellow paper and were to be completed by all teachers. Part II, which was to be completed only by those teachers who utilize microcomputers in their vocational programs, was printed on blue paper. Part I included the usage and location of microcomputers in the school system. Part II consisted of questions concerning the makes of microcomputers, types of accessories and software available to the vocational agriculture department. Part III included listing and open-ended questions to determine suggested topics for software development and teacher assessment of their needs

for integrating microcomputers into their vocational agriculture programs.

The questionnaire was field tested by five vocational agriculture teachers from Areas I and II. The results of the field test were evaluated and the teachers were asked to provide input as to needed changes to improve the quality and clarity of the instrument. The final revised questionnaire was then sent to the Texas Education Agency for approval by personnel in the Research Coordinating Unit.

Two mailings were made of the questionnaire (see Appendix B). Cover letters (see Appendix A) accompanied both the initial mailing and the follow-up mailing of the questionnaire. Teachers from 365 departments responded to the first mailing, and 100 additional responses were returned after the follow-up mailing.

Data Analysis

The questionnaire was designed to determine uses of microcomputers in Texas secondary schools, the makes and locations of the microcomputers and topics within the nine subject areas as listed in the Basic Curriculum Guide for Texas Vocational Agriculture Programs. Descriptive data gathered by use of the questionnaire were tabulated by geographical area and size of school. Frequencies, percentages, medians, and means were used

in tabulation. ANOVA was computed to determine significant differences by geographical area and school size. Significant differences were reported at the .05 level.

Phase II

Software Review

Vocational agriculture related software was ordered from suppliers throughout the United States. The software was reviewed in relation to cost, adaptability to Texas vocational agriculture programs, suitability of lesson for intended students, and the quality of the program in regard to interaction and graphics. The review covered as wide a range of software topics as was economically feasible.

Software Development

Priority areas for software development within the curriculum areas listed in the Basic Curriculum Guide for Vocational Agriculture were determined through tabulation of Part III of the teacher questionnaire. As topics in priority areas were determined, professors in the Agricultural Education department at Texas Tech University developed formats for the programs to be written. Two microcomputer programmers were employed to use the format guidelines and develop programs designed specifically for vocational agriculture.

CHAPTER IV

DATA ANALYSIS

Microcomputer Uses in Texas Secondary Schools

In Texas secondary schools, microcomputers are used in both administration and teaching. Table 1 provides a breakdown of microcomputer uses in secondary schools by school size.

TABLE 1

Microcomputer Uses in Texas Secondary Schools By School Size

School Size	Total Number of Schools	Administrative N	Administrative %	Teaching N	Teaching %	Not Used N	Not Used %
A (<140)	150	44	29.[illegible]	[illegible]0	67.1	42	28.2
AA (140-269)	97	56	57.7	77	79.4	11	11.3
AAA (270-644)	92	53	57.6	82	89.1	7	7.6
AAAA (645-1309)	44	36	81.8	37	84.9	4	9.1
AAAAA (>1309)	52	46	88.5	45	86.5	3	5.8
Unknown	11	6	54.6	5	45.5	3	18.2
TOTAL	446	241	54.0	346	77.6	70	15.7

F value (administrative) = 22.32; Pr>F = 0.0001
F value (teaching) = 5.32; Pr>F = 0.0003

With percentages ranging from 88.5 for 5A schools down to 29.7 in 1A schools, the large schools tended to use microcomputers more for administrative purposes than the small schools. Although more small schools use microcomputers in teaching, 67.1 and 79.4 percent respectively, for 1A and 2A schools, the larger schools, 4A and 5A, show a larger percentage of microcomputers used for teaching, 84.9 and 86.5 respectively. Of the 446 schools, only 70 or 15.70 percent reported not using microcomputers within their school systems. An analysis of variance revealed a significant difference between size of schools for the designations; administrative and teaching.

When arranged by geographic area, as shown in Table 2, the analysis of variance failed to reveal significant differences between areas for the previously designated categories. When comparing data revealed in Table 1 and Table 2, it may be noted that the range of percentages of microcomputers used in administration is closer, (38.5 to 71.4), when arranged by geographic area than when arranged by school size, (29.7 to 88.5), as in Table 1. The Teaching and Not Used categories are comparatively similar to those shown in Table 1. When considering all schools on the basis of their using microcomputers for administrative and teaching purposes, it

was found that 54.0 percent of the schools in Texas were using microcomputers for administrative purposes, 77.6 percent reported using microcomputers for teaching, and only 15.7 percent reported that microcomputers were not used in the school system.

TABLE 2

Microcomputer Uses in Texas Secondary Schools by Geographic Area

Geographic Area	Total Number of Schools	Administrative N	Administrative %	Teaching N	Teaching %	Not Used N	Not Used %
Area I	58	32	55.2	49	84.5	4	6.9
Area II	47	22	46.8	35	74.5	10	21.3
Area III	49	35	71.4	44	89.8	3	6.1
Area IV	39	15	38.5	27	69.2	6	15.4
Area V	58	37	63.8	45	77.6	10	17.2
Area VI	35	20	57.1	25	71.4	7	20.0
Area VII	41	21	51.2	32	78.0	7	17.1
Area VIII	47	25	55.6	33	71.7	11	23.9
Area IX	32	15	46.9	24	75.0	7	21.9
Area X	40	19	47.5	32	80.0	5	12.5
TOTAL	446	241	54.0	346	77.6	70	15.7

F value (administrative) = 1.65; Pr>F = 0.0987
F value (teaching) = 1.06; Pr>F = 0.3880

Microcomputer Uses in Texas Vocational Agriculture Programs

A breakdown of the number and percentages of schools utilizing microcomputers in the vocational agriculture program may be observed in Table 3. While only 0.9 percent of teachers responding to the survey reported using microcomputers as a teaching aid in Vocational Education for the Handicapped (VEH) programs, just over one percent reported using microcomputers in Coordinated Vocational Academic Education (CVAE). Almost three percent of the Cooperative Part-time Training (Coop) programs across the state incorporate microcomputers in training students. The largest usage in non-production agriculture programs was reported in pre-employment laboratory programs with 3.6 percent. Production agriculture proved to be the program area where the microcomputer was most heavily used for instructional purposes. Production agriculture III (Ag III) showed the highest usage with 11.4 percent, while percentages for Ag I and Ag II were calculated as 8.3 and 9.9 percent, respectively. Ag IV showed a slightly smaller usage with 7.8 percent reported. Overall usage of microcomputers in production agriculture programs was calculated at 9.6 percent. A majority of teachers in the

TABLE 3

BREAKDOWN OF SECONDARY SCHOOLS IN TEXAS USING MICROCOMPUTERS AS AN INSTRUCTIONAL AID IN VOCATIONAL AGRICULTURE PROGRAMS

	Prod Ag I	Prod Ag II	Prod Ag III	Prod Ag IV	Pre Emp Lab	Coop	CVAE	VEH	Plan to Use Within Next 5 Years	Not Used
Total Number Of Schools	37	44	51	35	16	13	6	4	243	84
Percent of Schools In Survey	8.3	8.5	11.4	7.8	3.6	2.9	1.3	.9	54.5	18.8

survey (54.5 percent) reported they were not currently using microcomputers but plan to incorporate their use into the vocational agriculture program within the next five years. Eighty-four (18.8 percent) of teachers in the survey indicated they do not have current plans to use microcomputers in their vocational agriculture programs.

Location of Microcomputers

The location of microcomputers in the school system was identified. This data may be seen in tabular form in Table 4. In almost one-half of the schools, teachers indicated that microcomputers were located in a central computer lab. In these 216 schools, the median number of microcomputers in the computer lab was eight. The next largest number of schools, 148, had microcomputers located in the math department with a median number of five microcomputers. A median of two microcomputers were found in four areas, the science department, one other vocational department, two or more other vocational departments, and in other areas with 57, 132, 35, and 82 schools, respectively. Thirty-four schools have microcomputers located in the vocational agriculture department with the median number of computers determined to be one.

TABLE 4

Texas Schools and Median Number of Computers

Located in the System for Instructional Purposes

	Agriculture Department	Math Department	Science Department	Computer Lab	One Other Vocational Department	Two or More Vocational Departments	Other
Total Number Of Schools	34	148	57	216	132	35	82
Median Number Of Computers	1	5	2	8	2	2	2

In 34 schools, microcomputers were located in the vocational agriculture department. Vocational agriculture teachers indicated that of all microcomputers in Texas secondary schools, two-thirds were available for use by students in vocational agriculture. However, only 42 percent of all teachers responding to the survey reported that microcomputers were available to the vocational agriculture department.

Makes of Microcomputers Used

In Part II of the teacher questionnaire, the teachers were asked to identify the makes of microcomputers used in the school. A breakdown of this data by geographic area is available in Table 5. The manufacturer of microcomputers most widely used in Texas schools was Radio Shack, as reported by 146 schools. In 100 of those schools the Radio Shack was available to the vocational agriculture department. Apple microcomputers were used in 137 of the schools, with 92 available for vocational agriculture. Sixty-two schools used Commodore microcomputers and 48 of those were available to students in vocational agriculture. Teachers from 24 schools reported having Texas Instrument microcomputers with 14 available to vocational agriculture. IBM microcomputers were used in 20 schools, 11 of which were accessible for

TABLE 5

Manufacturer of Microcomputers Used

In Texas Secondary Schools

Model

Area	Apple	Commodore	IBM	RADIO SHACK	TI	Other
I						
Total	17	14	0	23	3	4
Available	12	10	0	16	2	1
II						
Total	15	7	4	17	4	2
Available	10	5	4	13	4	2
III						
Total	20	4	2	16	1	1
Available	14	3	1	12	0	0
IV						
Total	8	7	1	10	4	2
Available	7	7	1	6	2	1
V						
Total	24	7	5	19	5	5
Available	16	6	2	14	3	4
VI						
Total	7	8	0	9	0	0
Available	3	6	0	9	0	0
VII						
Total	14	6	3	14	0	0
Available	10	4	2	7	0	0
VIII						
Total	10	3	1	13	1	0
Available	8	3	0	8	0	0
IX						
Total	9	4	1	6	4	1
Available	7	2	1	5	3	0
X						
Total	13	2	3	19	2	1
Available	5	2	0	10	0	0
TOTAL	137	62	20	146	24	16
TOTAL AVAILABLE FOR VO AG	92	48	11	100	14	8

NOTE: ANOVA revealed no significant differences between the geographic area and the make of microcomputers at the .05 level of significance.

use by students in vocational agriculture. Sixteen schools were reported to have a make of microcomputer other than those already listed, with eight schools making those available to the vocational agriculture department. It should be noted that many schools used more than one brand of microcomputer. The analysis of variance indicated no significant statistical differences between the geographic area and makes of microcomputers used.

Available Accessories

Microcomputer accessories used in teaching was another area addressed in the teacher questionnaire. Accessories considered were microcomputers with one disk drive, microcomputers with two disk drives, daisy wheel printers, and dot matrix printers as shown in the following:

Accessory	Number of Schools	Percent
1 Disk Drive	141	31.6
2 Disk Drives	172	38.6
Daisy Wheel Printer	64	14.3
Dot Matrix Printer	151	33.9

Only 14.3 percent of the schools used daisy wheel printers. Approximately one-third of the schools had accessories in each of the three other categories.

According to the survey responses, commercially produced software and school system or personally

developed software were in use in Texas vocational agriculture programs.

Vocational agriculture teachers in 85 schools (19.1 percent) indicated they were using commercially produced software. When compared to the 189 schools with microcomputers available to the vocational department, 45 percent used commercially produced software. Additionally, teachers in 48 schools (10.8 percent) utilized school system or personally developed software. When compared against the 189 schools with microcomputers available to the vocational agriculture department, over 25 percent of the teachers used school system or personally developed software.

Topics for Software Development

In Part III of the questionnaire, teachers listed specific topics for software development under the nine subject matter areas found in the Basic Curriculum Guide for Vocational Agriculture. The teachers were also allowed to list topics in areas other than curriculum relating to the vocational agriculture program. The topics were ranked as to the frequency each occurred throughout the survey responses. The two most requested software topics under each area are depicted in Table 6.

A complete listing of prioritized topics is shown in Appendix C.

TABLE 6

High Priority Topics for Software Development

Curriculum Area	Specific Topics	Number of Teachers Requesting
Animal Science	Rations	107
	Production Records	41
Soil Science	Fertilizer Usage & Ratio	65
	Soil Analysis	44
Plant Science	Plant Taxonomy	50
	Fertilizer Rates	28
Agricultural Mechanics	Bill of Materials	46
	Small Gas Engines	32
Agricultural Management	Farm Records	39
	Depreciation	30
Supervised Occupational Experience Programs	Record Book	201
	Degree Application	8
Leadership	Parliamentary Procedure	118
	FFA Quiz	92
Opportunities in Agriculture	Careers in Agriculture	60
	Job Descriptions	25
Environmental Protection & Energy Conservation	Electricity Usage & Conservation	10
	Safe Use of Chemicals	9
Other Areas	Shop Inventory	158
	FFA Budget	39

The most requested topic for software development was for the Supervised Occupational Experience FFA Record Book, which received 201 requests. The second most widely requested topic, with 118 requests, was Parliamentary Procedure under the Curriculum Area

Leadership. Under the area of Animal Science, a software package dealing with Rations was requested by 107 teachers. Topics reques ed by 50 or more teachers included; Fertilizer Usage and Rates, Plant Taxonomy, Practice for FFA Quiz Contest, and Careers in Agriculture. Software programs for Animal Science Production Records, Soil Analysis, Fertilizer Rates, Bill of Materials, Small Gas Engines, Farm Management Records, Depreciation, and Job Descriptions were sought by 25 to 50 teachers. Other priority topics asked for by less than 25 teachers included Degree Application Instructions, Electricity Usage and Conservation, and Safe Use of Chemicals. Priority topics under the non-curriculum area were Shop Inventory and FFA Budget programs requested by 158 and 39 teachers, respectively.

Teacher Inservice Needs

Results from Part III of the survey (designed to elicit open-ended responses from vocational agriculture teachers regarding their microcomputer inservice needs) revealed 96 percent of the teachers requesting instruction in basic microcomputer operation. Fifty-three percent of the teachers suggested a short-course in BASIC programming language, while 48 percent of the teachers responding requested a workshop concerning available

software. It should be noted that of the 446 usable questionnaires, only 224 (50.2 percent) of the open-ended questions were completed with one or more suggestions.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

After evaluating the data, the following conclusions were made.

1. The larger schools tend to use microcomputers more than small schools for both administration and teaching, however, small schools are using microcomputers in both areas as well.
2. Microcomputers are used in Texas secondary schools in teaching more than in administration.
3. Vocational agriculture teachers use microcomputers more in Production Agriculture III than in any other program area of vocational agriculture.
4. A majority of Texas vocational agriculture teachers (54.5 percent) who are not already using microcomputers plan to incorporate microcomputers as a teaching and learning aid within the next five years.
5. Microcomputers are located in various places in Texas schools, however, most are located in a

special computer lab. Only 7.6 percent of vocational agriculture departments have microcomputers actually located in the department.

6. Forty-two percent of Texas secondary schools have microcomputers available for use by students and teachers in the vocational agriculture department.
7. Radio Shack and Apple microcomputers are available in more schools than other makes.
8. Less than 50 percent of vocational agriculture departments with microcomputers available have commercially produced or personally developed software in use.
9. The programs most requested by vocational agriculture teachers were a Supervised Occupational Experience Record Book program, Shop Inventory, Parliamentary Procedure and Rations.
10. Numerous sources were available for agricultural oriented software packages for use in secondary vocational agriculture programs. However, a critical shortage of practical and economical computer programs existed.

Recommendations

1. Vocational agriculture teachers need to work with their administrators in obtaining microcomputers and printers to be located in the vocational agriculture department.
2. If it is not possible to purchase microcomputers and printers to be housed in the vocational agriculture department, vocational agriculture teachers should work with their administrators in obtaining access to computers located in the school during regularly scheduled vocational agriculture class periods.
3. The compatability of hardware and the availability of quality software should be a careful consideration in future equipment purchases by schools and departments.
4. Additional specialized software should be developed especially for use in vocational agriculture.
5. Priority areas for needed software should be re-evaluated and updated as vocational agriculture teachers and students become more proficient in the use of microcomputers.

6. Teacher educators should incorporate pre-service education concerning microcomputers if not currently required for graduation.
7. Universities need to provide inservice workshops for vocational agriculture teachers in microcomputers at beginning and advanced levels.
8. Microcomputer manufacturers should be encouraged to present workshops for teachers at the district, area and state levels.

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APPENDICES

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APPENDIX A

COVER LETTERS

Texas Tech University

Department of Agricultural Education

Box 4169/Lubbock, Texas 79409/(806) 742-2816

October 25, 1983

Texas Tech Univeristy faculty and Texas Education Agency personnel have undertaken a project to identify needs and to develop materials for microcomputer instruction in Texas vocational agriculture programs. As vocational agriculture teachers, you are an integral part of this effort to upgrade our capabilities regarding microcomputer usage. Part of this improvement will depend upon your input on the enclosed survey.

Please complete this survey, even if you are not currently utilizing computers in your vocational agriculture program. In multiple-teacher departments, only one completed survey is needed from each school, however, the survey should reflect the needs of the total vocational agriculture program. Some questions may require you to seek information from other persons within your school system if the answers are not readily available to you.

This survey is critical to the successful completion of the project. We hope you will complete the survey now and return it to us in the enclosed self-addressed stamped envelope.

Jay Eudy

Jay Eudy, Director
Agricultural Education
Texas Education Agency

M.J. Cepica

Marvin J. Cepica, Project Director
Agricultural Education Department
Texas Tech University

Texas Tech University
Department of Agricultural Education
Box 4169/Lubbock, Texas 79409/(806) 742-2816

November 29, 1983

HELP!! Your help in completing and returning the enclosed microcomputer survey will provide information we need to develop agricultural related computer programs to assist you in instructing your Vo-Ag students. Your department may not have access to computers, but you can plan for the future, when computers will be available to you. With the information you furnish by completing and returning the questionnaire, we can develop computer programs designed for Texas Vocational Agriculture departments which can be used to motivate your students and make your job more exciting.

Your input on this questionnaire is vital in order for us to meet your needs and design software you will be able to use. At the time of this mailing we had not received your response. If you have already completed and returned the survey, we thank you for your cooperation. If, however, you have not yet completed the questionnaire, please take a few minutes to complete the one enclosed and return it to us in the envelope provided. Please help us so we can help you.

M.J. Cepica
Marvin J. Cepica
Project Director

Carl G. Igo
Carl G. Igo
Research Assistant

P.S. By returning the questionnaire to us postmarked on or before December 20, 1983, you will automatically be registered for a chance to win a BASIC program of the Texas Vocational Agriculture record book.

APPENDIX L

QUESTIONNAIRE

SURVEY OF
COMPUTER RELATED INSTRUCTION
IN VOCATIONAL AGRICULTURE

NOTE: *Please complete this questionnaire as it relates to your school and the total vocational agriculture program. If you do not utilize microcomputers in your vocational agriculture program, please complete only Part 1 and Part 3 of this survey (yellow pages).*

PART 1

Vo Ag Department _____ (*School*), _____ (*Town*)

Size of High School: (5A, 4A, 3A, 2A, 1A) _____

Total Number of Students Enrolled in Vo Ag (include Production, Pre Emp. Lab, Co-Op, CVAE & VEH) _____

MICROCOMPUTER USES IN YOUR SCHOOL SYSTEM

(*Please check (✓) those which apply*)

Administrative _____

Teaching _____

Not Used _____

USE OF MICROCOMPUTER(S) AS AN INSTRUCTIONAL AID IN VO AG CLASSES

(*Please check (✓) those which apply*)

Production Ag I _____

Production Ag II _____

Production Ag III _____

Production Ag IV _____

Pre Emp. Lab _____

Co-Op _____

CVAE _____

VEH _____

Computer not used presently but plan to use computer as an instructional aid in the future (within next 5 years).

_____

Computer not used for instructional purposes.

_____

LOCATION AND NUMBER OF MICROCOMPUTER(S) FOR STUDENT INSTRUCTION

(*Please give respective number of computers in your school*)

Vo Ag Dept _____ (*Number*)

Math Dept _____ (*Number*)

Science Dept _____ (*Number*)

Special Computer Laboratory _____ (*Number*)

Other Vocational Department(s) (Please Specify)

_____ (*Dept*) _____ (*Number*)

_____ (*Dept*) _____ (*Number*)

Other (Please Specify)

_____ (*Location*) _____ (*Number*)

None _____

PART 2

MAKE AND MODEL OF MICROCOMPUTERS USED IN TEACHING VO AG OR OTHER SCHOOL ACADEMIC OR VOCATIONAL SUBJECTS

(Please list all models of respective computers in your school and check appropriate blanks)

	Is computer available for use in your Vo Ag Dept	
Apple, Model _____	Yes_____	No_____
Commodore, Model _____	Yes_____	No_____
IBM, Model _____	Yes_____	No_____
Radio Shack, TRS 80 Model _____	Yes_____	No_____
Texas Instruments, Model _____	Yes_____	No_____
Other, Make and Model _____	Yes_____	No_____

ACCESSORIES FOR MICROCOMPUTERS USED IN TEACHING VO AG OR OTHER SUBJECTS

(Please check (✓) the following which apply to your department or school)

One Disk Drive
Yes _____
No _____

Two Disk Drives
Yes _____
No _____

Daisywheel Printer
Yes _____
No _____

Dot Matrix Printer
Yes _____
No _____

SOFTWARE IN USE IN YOUR VO AG PROGRAM

(Please answer the following regarding software currently used in your program)

Commercially Produced Software Yes_____ No_____

If yes, please list name and source of program(s)

_____

_____

School System or Personally Developed Software Yes_____ No_____

If yes, Please list specific topic(s)

_____

_____

PART 3

(Please list specific topics for software development in each of the following curriculum areas you believe would be appropriate for use in Vo Ag.)

Curriculum Area (As found in Basic Curriculum Guide for Vocational Agriculture)	Specific unit(s) or job(s)
	(Example: Pearson's square method of computing livestock rations.)
Animal Science	_____
	_____
Soil Science	_____
	_____
Plant Science	_____
	_____
Agricultural Mechanics	_____
	_____
Agricultural Management	_____
	_____
Supervised Experience Programs	_____
	_____
Leadership	_____
	_____
Opportunities in Agriculture	_____
	_____
Environmental Protection and Energy Conservation	_____
	_____
Areas other than curriculum which would relate to the Vo Ag Program	(Example: shop inventory) _____
	_____
	_____

Concerning in-service education, what instruction do you need to help you integrate computer instruction in your Vo Ag Program? (Please be as specific as possible.)

_____

_____

_____

Additional comments regarding the use of computers in the Vocational Agriculture program:

APPENDIX C

PRIORITY TOPICS FOR SOFTWARE DEVELOPMENT

ANIMAL SCIENCE

Rations	107
Production Records	41
Genetics	41
Breeding Records	35
Breeds	32
Diseases & Parasites	24
Rate of Gain	22
Feed Ratios & Conversion Analysis	21
Livestock & Carcass Evaluation	17
Least Cost Ration	16
205 Day Adjusted Weaning Weight	7
Reproduction & Artificial Insemination	4
Nutrition	4
Anatomy	3
Production Costs Per Animal Unit	2
Ranch Management	2
Ear Notching	1
Spraying Schedule	1
Stocking Ratio	1

SOIL SCIENCE

Fertilizer Usage & Rates	65
Soil Analysis	44
Soil Samples & Land Evaluation	38
Textural Triangle	18
Soil Erosion & Conservation	11
Soil Nutrients	9
Soil Testing	8
Soil Surveys	7
Estimating Soil Productivity	5
Slope Determination	2
Determining Acreage	1
Soil Water Movement	1
Seeding Rates	1

PLANT SCIENCE

Plant Taxonomy	50
Fertilizer Rates	28
Propagation	19
Insect & Disease Control	18
Planting Rates	16
Market Predictions	15
Genetics	11
Plant Nutrient Requirements	10
Plant Productivity	5
Pruning, Orchard Management, & Spraying	4
Plant Yields	3
Landscaping	2
Rotation Schedules	1
Bed Preparation	1
Set-Aside Programs	1
Crop Finance	1
Grain Grading	1
Brush Control Costs	1
Pasture Management	1
Determining Acreage	1
pH Classification	1
Sprayer Calibrations	1

AGRICULTURAL MECHANICS

Bill of Materials	46
Small Gas Engines	32
Safety Test	24
Welding	19
Concrete	16
Tool Identification	14
Tractor Maintenance & Trouble Shooting	13
Electricity	13
Board Feet	10
Farm Leveling	5
Measuring & Fractions	5
Rafters, Slope, & Pitch	4
Equipment Analysis	4
Sprayer Calibration	3
Parts List	3
Project Costs	3
Micrometers	2
Agricultural Mechanics Contest Questions	2
Surveying	2
Calculating Acreage	2
Service Records	2
Plumbing	1
Pipe Bending	1
Drafting	1
Shop Plans	1
Torque Specifications	1
Horse Power	1
Fencing Costs	1

AGRICULTURAL MANAGEMENT

Farm Records	39
Depreciation	30
Income Tax	30
Interest	24
Financial Statements	21
Loans	18
Cost of Production	17
Market Analysis	17
Record Keeping	13
Break Even Point	12
Investment Planning	8
Supply/Demand	8
Profit Margins	6
Futures & Commodities	4
Credit	4
Harvesting Cost Analysis	4
Insurance	4
Contest Questions & Answers	4
Graphing	3
Estate Planning & Wills	2
Land Cost	2
Planning Sow Operation	2
Sale Records	1
Leases	1
Farm Law	1
Range Management	1
Banking Procedures	1
Co-Op	1
Payroll	1
Horticulture	1
Herd Management	1

SUPERVISED OCCUPATIONAL EXPERIENCE PROGRAM

Record Book	201
Degree Applications	8
Project Cost Analysis	6
Proficiency Awards	4
Feeding & Exercise Program	1
Inventories	1
Break-Even Points	1

LEADERSHIP

Parliamentary Procedure Problems	118
Quiz	92
Answers to Gray's Guide	10
Question & Answer of Manual	10
Scripts	8
Extemporaneous & Public Speaking	4
Program of Work	3
Proficiency Awards	2
Treasurer's Book	1
Committees	1

OPPORTUNITIES IN AGRICULTURE

Careers in Agriculture	60
Job Descriptions	25
College & Majors	5
Career Matching Tests	4
Job Placement & Applications	3
Co-Op Job Opportunities	2
Jobs Chosen by Past FFA Members	1
Computer Job Opportunities	1
Job Satisfaction Surveys	1
Job Bank	1
Vocational Agriculture Degree Programs	1

ENVIRONMENTAL PROTECTION & ENERGY CONSERVATION

Electricity Usage & Conservation	10
Certification Requirements & Safe Use of Chemicals	9
Insulation	4
Increasing Gas Mileage Fuel Efficiency	4
Cost Analysis	4
Soil Conservation	2
Waste Dumping	2
Wildlife Conservation	2
Water Conservation	1
Terracing Layout	1
Tractor Efficiency	1
Irrigation Costs	1
Service Awards	1
Minimum Tillage	1

OTHER

Shop Inventory	158
FFA Budget	39
Student Follow-Up	25
Grades	24
Department Budget	20
Departmental Inventory	17
FFA, Young Farmer Roster	15
State & Federal Reports	13
Stock Show Entries & Results	9
Travel	7
Repair Lists	7
School Farm Inventory; Greenhouse Inventory	6
Absences & Tardies; Class Roll	5
Project Records: Weight, Visits, etc.	5
Calendar	4
Address List: Stock Shows, Equipment Companies, etc.	3
Test Storage	3
Awards	3
Lesson Plans	2
Local Show Buyer Address List	2
FFA Participation Records	2
Co-Op Job Areas	2
Banquet Budget	1
Test Grading & Averaging	1
Maintenance Schedule	1
Agricultural Dictionary	1
Contest Grading	1
4-Year Plan	1